The FHWA Travel Model Improvement Program Workshop over the Web

The Travel Model Development Series: Part I – Travel Model Estimation

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July 16, 2009

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Webinar Outline

- Session 1: Introduction – October 16, 2008
- Session 2: Data Set Preparation – November 6, 2008
- Session 3: Estimation of Non-Logit Models – December 11, 2008
- Session 4: Estimation of Logit Models – February 10, 2009

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Webinar Outline (continued)

- Session 5: Disaggregate and Aggregate Validation Procedures – March 12, 2009
- Session 6: Advanced Topics in Discrete Choice Models – April 14, 2009
- Session 7: Highway and Transit Assignment Processes – May 7, 2009

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Webinar Outline (continued)

- Session 8: Evaluation of Model Validation Results – June 9, 2009
- Session 9: Real Life Experiences in Model Development, Webinar Wrap-Up – July 16, 2009

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The Model …

- … takes a set of *input data* …
- … and converts it to a set of *output data* …
- … using a set of *mathematical models* …
- … which use *parameters* to perform the conversions
- The input and output data for individual model components may be temporary, or interim

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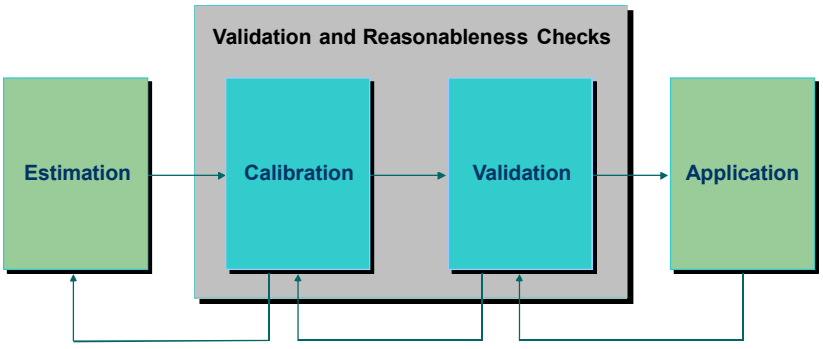
The Model Development Process



The Role of Data in Travel Modeling

- Estimation
  - Local data for parameter estimation
- Validation/calibration
  - Observed data for comparisons and checks
- Application
  - Network, socioeconomic, and other data

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Aggregate Model Components
Four-Step Models

- **Trip production**
- **Trip attraction**
- **Trip distribution**
- Mode choice
- Assignment
- **Time of day**
- Auto ownership
- Other
  - Trucks/freight
  - External trips
  - Other?

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Disaggregate Model Components
Four-Step Models

- Trip production
- Trip attraction
- Trip distribution
- **Mode choice**
- Assignment
- Time of day
- **Auto ownership**
- Other
  - Trucks/freight
  - External trips
  - Other?

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Why Is Getting the Parameters Called Model "Estimation"?

- We cannot know the true parameters, and so we must estimate their values
- Every person has his/her own parameters
- We use the same parameters for groups of similar travelers

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Relevant Statistical Concepts

- Estimators
- Maximum likelihood
- Confidence intervals
- Statistical significance

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Choosing the Independent Variables

- Relevance to the travel choice
- Availability in the estimation data set
- Availability for model application (forecasting)
- Statistical testing

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Validation Includes a Lot of Things

- Checks of input data
- Reasonableness/logic checks
- Comparison of model results to independent data sources
- Sensitivity checks

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Aggregate vs. Disaggregate Validation

- Disaggregate validation
  - Explores how well model fits observed data at the household or individual level
  - Involves defining subgroups of observations
  - Compares model results with observed data to reveal systematic biases
  - Plays more of a role in the model estimation phase
- Aggregate validation
  - Provides a general overview of model performance through regional travel characteristics
  - Applies model at the regional, district, and zonal level

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Aggregate vs. Disaggregate Validation

- Aggregate models require aggregate validation
- Disaggregate models require both aggregate and disaggregate validation

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Model Validation/Calibration

- More than just regionwide validation – “adjusting constants”
- Segmentation variables – revising, adding, deleting
- Adjusting network parameters and settings
- Often “points back” to issues with other model steps

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Highway Assignment

- Input: Vehicle trip tables for each time period, perhaps by class
  - SOV
  - HOV
  - Truck
  - Toll road users?
- Input: Highway network (by class)
- Outputs: Link traffic volumes and speeds by time period (by class)

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Transit Assignment

- Network decisions
  - Relationship between bus and highway speeds
  - Fare representation
  - Coding decisions
- User settings
- Single path vs. multipath

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Assignment is Route Choice

- Unlike some models such as mode choice, the outputs of assignment are not for the choice itself (route) but an aggregate computation from the choice.
- Therefore, only aggregate validation is performed although we may look at a fine level of detail (links).

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Overall Model Validation

- The overall results are the results of the final step (assignment)
- But results may indicate things to check in earlier model steps:
  - Screenline issues → check trip distribution
  - VMT too high or low → check trip rates
  - Link volume issues → check networks

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